IN THE MATTER OF
KOREAN PATENT APPLICATION
UNDER SERIAL NO. 10-2003-0020533

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LEE, SHIN SOOK

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1. Abstract, Specification (Drawing) – 1copy

[Translation]

ABSTRACT OF THE DISCLOSURE

[Abstract]

A data processing method for supporting an AMR CODEC is disclosed. When a receiving side of a wireless communication system receives erroneous data, it checks whether the data is data for which an erroneous data processing method has been set. If an erroneous data processing method has been set for the data, the data is processed according to an error allowable data processing method. If the error data processing method has not been set for the data, the data is discarded.

[Representative drawing]

FIG. 6

[SPECIFICATION]

[Title of the Invention]

DATA PROCESSING METHOD FOR SUPPORTING AMR CODEC

[Brief description of the Drawings]

FIG 1 is a block diagram showing the structure of a UMTS network;

FIG. 2 is a block diagram showing the structure of a radio interface protocol applied for a Uu interface of FIG. 1,

FIG. 3 illustrates a format of a MAC PDU;

FIG. 4 is a flow chart of a related art data processing method of the MAC layer. FIG. 5 is a flow chart of a related art data processing method of the RLC layer;

FIG. 6 is a flow chart of a data processing method in accordance with a first embodiment of the present invention; and

FIG. 7 is a flow chart of a data processing method in accordance with a second embodiment of the present invention.

**** Explanation for the major reference numerals ****

10 : terminal 20 : UTRAN

21 : base station (Node B)

23 : radio network controller (RNC)

25 : radio network sub-system (RNS)

30 : core network (CN)

31 : mobile switching center (MSC)

33 : GMSC 35 : SGSN

37 : GGSN

[Detailed description of the invention]

[Object of the invention]

[Field of the invention and background art]

The present invention relates to a data processing method for supporting an adaptive multi-rate (AMR) CODEC in a universal mobile telecommunications system (UMTS), and more particularly, to a data processing method capable of supporting an AMR CODEC without causing malfunction of other functions in a radio interface protocol architecture.

A universal mobile telecommunication system (UMTS), which is a European-type IMT-2000 system, is a third generation mobile communication system that has evolved from a European standard known as Global System for Mobile communications (GSM) that aims to provide an improved mobile communication service based upon a GSM core network and wideband code division multiple access (W-CDMA) wireless connection technology.

In December 1998, the ETSI of Europe, the ARIB/TTC of Japan, the T1 of the United States, and the TTA of Korea formed a Third Generation Partnership Project (3GPP), which is creating the detailed specifications of the UMTS technology.

Within the 3GPP, in order to achieve rapid and efficient technical development of the UMTS, five technical specification groups (TSG) have been created for performing the standardization of the UMTS by considering the independent nature of the network elements and their operations.

Each TSG develops, approves, and manages the standard specification within a related region. Among these groups, the radio access network (RAN) group (TSG-RAN) develops the standards for the functions, requirements, and interface of the UMTS terrestrial radio access network (UTRAN), which is a new radio access network for supporting W-CDMA access technology in the UMTS.

The TSG-RAN group consists of one plenary group and four working groups.

WG1 (Working Group 1) has been developing specifications for a physical layer (Layer 1), and WG2 has been specifying functions of a data link layer (Layer 2) between UE and UTRAN. In addition, WG3 has been developing specifications for interfaces among Node Bs (the Node B is a kind of base station in the wireless communications), Radio Network Controllers (RNCs) and the core network. Lastly, WG4 has been discussing requirements for radio link performance and radio resource management.

FIG. 1 illustrates an exemplary basic structure of a UMTS network applicable to the conventional art to the present invention. As shown in FIG. 1, the UMTS is roughly divided into a terminal 10 (or user equipment: UE), a UTRAN 20, and a core network (CN) 30.

The UTRAN 20 includes one or more radio network sub-systems (RNS) 25. Each RNS 25 includes a radio network controller (RNC) 23, and a plurality of Node-Bs 21 managed by the RNC 23. The RNC 23 handles the assigning and managing of radio resources, and operates as an access point with respect to the core network 30.

The Node-Bs 21 are managed by the RNC 23, receive information sent by the physical layer of the terminal 10 through an uplink, and transmit data to the

terminal through a downlink. The Node-Bs 21, thus, operate as access points of the UTRAN 20 for the terminal 10.

The services provided to a specific terminal 10 are roughly divided into circuit switched (CS) services and packet switched (PS) services. For example, a general voice conversation service is a circuit switched (CS) service, while a Web browsing service via an Internet connection is classified as a packet switched (PS) service.

For supporting circuit switched services, the RNCs 23 are connected to the MSC (Mobile Switching Center) 31 of the core network 30, and the MSC 31 is connected to the GMSC (Gateway MSC) 33 that manages the connection with other networks.

For supporting packet switched services, the RNCs 23 are connected to the SGSN (Serving GRPS Support Node) 35 and the GGSN (Gateway GPRS Support Node) 37 of the core network 30.

The SGSN 35 supports the packet communications going toward the RNCs 23, and the GGSN 37 manages the connection with other packet switched networks, such as the Internet.

Various types of interfaces exist between network components to allow the network components to transmit and receive information to and from each other for mutual communication therebetween.

An interface between the RNCs 23 and the core network 30 is defined as an Iu interface. In particular, the Iu interface between the RNCs 23 and the core network 30 for packet switched systems is defined as "Iu-PS," and the Iu interface between the RNCs 23 and the core network 30 for circuit switched systems is defined as "Iu-CS." Also, the radio access interface between the

terminal 10 and the UTRAN 20 is defined as the "Uu" interface.

FIG. 2 is a block diagram showing the structure of a radio interface protocol applied for the Uu interface of FIG. 1.

The radio interface protocol for the Uu interface has horizontal layers comprising a physical layer, a data link layer, and a network layer, as well as vertical planes comprising a user plane (U-plane) for transmitting user data and a control plane (C-plane) for transmitting control information.

The user plane is a region that handles traffic information of the user, such as voice or Internet protocol (IP) packets, while the control plane is a region that handles control information for an interface of a network, maintenance and management of a call, and the like

The protocol layers in FIG 2 can be divided into a first layer (L1), a second layer (L2), and a third layer (L3) based on the three lower layers of an open system interconnection (OSI) standard model. Each layer (L1, L2, L3) will be described in more detail as follows.

The first layer (L1), namely, the physical layer, provides an information transfer service to an upper layer by using various radio transmission techniques. The physical layer is connected to an upper layer called a medium access control (MAC) layer, via a transport channel The MAC layer and the physical layer send and receive data with one another via the transport channel

The MAC layer, handling mapping between logical channels and transport channels, provides an allocation service of the MAC parameters for allocation and re-allocation of radio resources. The MAC layer is connected to an upper layer called the radio link control (RLC) layer, via a logical channel, and various logical channels are provided according to the kind of transmitted information.

In general, when information of the control plane is transmitted, a control channel is used, and when information of the user plane is transmitted, a traffic channel is used.

Also, the logical channels include a common channel and a dedicated channel depending on whether the logical channel is shared. The logical channels include a dedicated traffic channel (DTCH), a dedicated control channel (DCCH), a common traffic channel (CTCH), a common control channel (CCCH), a broadcast control channel (BCCH), and a paging control channel (PCCH).

The MAC layer is connected to the physical layer by the transport channel, and can be divided into a MAC-b sub-layer, a MAC-d sub-layer, a MAC-c/sh sub-layer, and a MAC-hs sub-layer according to the type of transport channel to be managed.

The MAC-b sub-layer manages a BCH (Broadcast Channel), which is a transport channel handling the broadcasting of system information. The MAC-c/sh sub-layer manages a common transport channel, such as a forward access channel (FACH), a downlink shared channel (DSCH) or a paging channel (PCH), which is shared by a plurality of terminals. The MAC-d sub-layer manages a dedicated channel (DCH), which is a dedicated transport channel for a specific terminal.

The RLC layer supports reliable data transmissions, and performs a segmentation and concatenation function on a plurality of RLC service data units (RLC SDUs) delivered from an upper layer. When the RLC layer receives the RLC SDUs from the upper layer, the RLC layer adjusts the size of each RLC SDU in an appropriate manner upon considering processing capacity, and then creates certain data units with header information added thereto.

The created data units are called protocol data units (PDUs), which are then transferred to the MAC layer via a logical channel. The RLC layer includes a RLC buffer for storing the RLC SDUs and/or the RLC PDUs.

Each RLC PDU transferred to the MAC layer is a MAC SDU. Namely, the MAC SDU is another name of the RLC PDU. If necessary, the MAC layer generates a MAC PDU by adding a header to the MAC SDU, and transmits the MAC PDU to the physical layer through a suitable transport channel.

The MAC layer performs the function of identifying the UEs (terminals) and the logical channels. There are two main reasons for identification: first, the UEs need to be distinguished from one another because many UEs share a common transport channel; and second, the logical channels must be distinguished from one another because logical channel multiplexing is performed. FIG. 3 illustrates a format of the MAC PDU

Thus, for identification, the MAC PDU includes a MAC header including a portion or the entirety of a TCTF (target channel type field), a UE-ID type, a UE-ID, and/or a C/T(Control/Traffic) field.

A MAC header is added to each MAC SDU (Service Data Unit) within a MAC PDU. That is, even those MAC SDUs that are transmitted during the same TTI (Transmission Time Interval) have different MAC headers added thereto.

Identification of the UE (i.e., a UE-ID field) is necessary when a dedicated logical channel (such as DCCH or DTCH) is mapped to a common transport channel (such as the RACH, FACH, CPCH, or DSCH). To achieve this, the MAC layer adds a radio network temporary identity (RNTI) (which is a type of identification information for a UE) to the UE-ID field of the header. There are three types of RNTIs: a U-RNTI (UTRAN RNTI), a C-RNTI (Cell RNTI), and a

DSCH-RNTI. Thus, a UE-ID type field that indicates the type of RNTI used is also transmitted as part of the header.

There are two kinds of identifications for the logical channel: one is a TCTF (Target Channel Type Field), and the other is a C/T field. The TCTF is required for the transport channel where a dedicated logical channel (such as a DCCH and DTCH) can be mapped together with other logical channels.

Referring to FDD (Frequency Division Duplexing), the TCTF of the FACH identifies that the mapped logical channel is a BCCH, a CCCH, or a CTCH, or is a dedicated logical channel (DCCH or DTCH), while the TCTF of the RACH identifies that the mapped logical channel is a CCCH or a dedicated logical channel. However, the TCTF does not identify the particular type of dedicated logical channel that was used.

The identification of the dedicated logical channel is provided by the C/T field. The reason for this is that, unlike other logical channels, several dedicated logical channels can be mapped to one transport channel.

Each of the dedicated logical channels mapped to one transport channel has a logical channel identity, which is used as the C/T field value. However, if only one dedicated logical channel is mapped to one transport channel, the C/T field is not used.

Table 1 below shows the MAC header information that are used according to the mapping relationship between logical channels and transport channels for FDD. In Table 1, a "C/T field" exists when several dedicated logical channels (DCCH or DTCH) are mapped. Also, "N" indicates that there is no header, "-" indicates that there is no mapping relationship, and "UE-ID" indicates that both a UE-ID field and a UE-ID type field exist. A UE-ID field always exists together

with a UE-ID type field.

[Table 1]

	DCH	RACH	FACH	DSCH	CPCH	BCH	PCH
DCCH or DTCH	C/T	TCTF UE-ID C/T	TCTF UE-ID C/T	UE-ID C/T	UE-ID C/T	-	-
BCCH	-	-	TCTF	-	-	N	-
PCCH	-	-	-	-	-	-	N
CCCH	-	TCTF	TCTF	-	-	-	-
CTCH	-	-	TCTF	-	-	-	-

The RLC layer will be explained in more detail as follows.

A basic function of the RLC layer is to guarantee the quality of service (QoS) of each RB (Radio Bearer) and their corresponding data transmissions. As the RB service is a service that the second layer of the radio protocol provides to higher layers, the entire second layer affects the QoS, and in particular, the RLC layer has significant influence to the QoS.

The RLC layer provides an independent RLC entity for each RB in order to guarantee the particular QoS of the RB, and provides three RLC modes, namely, a transparent mode (TM), an unacknowledged mode (UM), and an acknowledged mode (AM) to support various types of QoS. As the three RLC modes (TM, UM, AM) respectively support different QoS requirements, there are differences in their operations and specific functions Accordingly, each operational mode of the RLC must be considered in more detail.

The particular RLC for each mode will be referred to as TM RLC, UM RLC, and AM RLC.

First, in TM RLC, no protocol overhead is added to the RLC SDU that is transferred from a higher (upper) layer. Thus, as the RLC lets the SDU pass "transparently," this mode is called transparent mode (TM). Accordingly, the user plane and the control plane perform the following functions.

In the user plane, because a data processing time at the RLC layer is short, real-time circuit data transmissions (such as voice and streaming) in the circuit service domain (CS domain) are handled.

In the control plane, because there is no protocol overhead for the RLC layer, the RLC layer transmits RRC (Radio Resource Control) messages from an unspecified terminal (UE) via the uplink, and transmits via the downlink, RRC messages that are broadcast to all terminals (UE) within a cell.

Unlike the transparent mode, a mode in which protocol overhead is added at the RLC layer is called non-transparent mode. Non-transparent mode is divided into unacknowledged mode (UM) that has no reception acknowledgement for the transferred data, and acknowledged mode (AM) that has acknowledgement

In the UM RLC, a PDU header including a sequence number (SN) is added to each PDU and then transferred, in order to allow the receiving side to identify which PDUs were lost during transmission.

As such, in UM RLC, the user plane handles broadcast/multicast data transmissions or real-time packet data transmissions, such as voice (e.g., VoIP) and streaming in the packet service domain (PS domain). In the control plane, transmission of those RRC messages that need no acknowledgement response, among all RRC messages delivered to a specific terminal or terminal group within a cell region, is handled.

In AM RLC (a type of non-transparent mode), like UM PLC, a PDU header including SN is added to the PDU. However, unlike the UM, in AM, a receiving side provides reception acknowledgement of the PDU sent from a transmitting side. In AM RLC, the receiving side provides acknowledgement in order to

request re-transmission of any PDUs that have not been properly received, and this function of re-transmission is the most distinguishing characteristic in AM RLC. Thus, the object of AM RLC is to guarantee error-free data transfers through re-transmissions. Due to this characteristic of AM RLC, transmission of non-real-time packet data such as TCP/IP in the PS domain is handled by the user plane, and transmission of RRC messages that absolutely need acknowledgement, among all the RRC messages transmitted to a specific terminal, is handled by the control plane.

When data is received from a peer (i.e., opposing party) through a wireless section (region), the physical layer performs a CRC (Cyclic Redundancy Code) checking on data blocks in order to know whether there is an error in each data block. If an error is detected, the physical layer transfers the CRC error information together with a corresponding data block to the MAC layer.

Upon receiving a MAC PDU together with the CRC error information from the physical layer, the MAC layer determines the corresponding PDU to be an erroneous PDU, and discards the corresponding MAC PDU. If there is no CRC error information for the MAC PDU, the MAC layer transfers the MAC PDU to the RLC layer as soon as it is received.

Since data containing a CRC error is discarded at the MAC layer, when RLC PDUs are transferred from the MAC layer, the RLC layer determines these RLC PDUs as normal PDUs and processes them according to a normal PDU processing procedure.

The above-described data processing procedure is in accordance with initially adopted standards, but data processing procedures of the MAC layer and the RLC layer have been somewhat modified to support an adaptive multi rate

(AMR) codec.

The AMR codec is a voice communication (speech) codec of the UMTS standardized by ETSI in 1999, which applies bit rate allocation between a voice coding and a channel coding to thereby optimize a speech quality in various wireless channel states. With the AMR codec, even though the received data has an error, the data is used as it is. If the received data has a quality that is good enough to be used by the AMR codec, but is discarded only because it contains a CRC error, this can be a waste of wired/wireless resources. Accordingly, in order to effectively support the AMR codec, the operations of the MAC layer and the RLC layer have been modified as follows.

Even if the MAC PDU transferred from the physical layer has a CRC error, the MAC layer still transfers the corresponding PDU to the RLC layer. At the same time, when the MAC layer transfers the CRC error-containing PDU to the RLC layer, it informs the RLC layer of the existence of the CRC error so that the RLC layer can suitably process the corresponding PDU. In this respect, however, the CRC error technique fails to inform which part of the PDU is erroneous, but simply informs that there is an error in the PDU.

If the received MAC PDU causes the CRC error and includes a header, the MAC layer cannot rely on the header of the received MAC PDU. Namely, the MAC layer cannot check whether the MAC PDU has reached the intended destination (or a target UE) and cannot determine through which logical channel it is to transfer the MAC SDU (included in the MAC PDU) to the RLC layer. Thus, in this case, the MAC layer operation has been modified so that the MAC layer discards the corresponding MAC PDU.

If the RLC layer is in the TM state and a PDU received from the MAC layer

contains a CRC error, the RLC layer operates according to a set value referred to as a 'delivery of erroneous SDUs,' which is an environment parameter for processing data that contain errors. The delivery of erroneous SDUs is not set in every TM RLC, but set only when a logical channel connected to the TM RLC is a dedicated traffic channel (DTCH).

The 'delivery of erroneous SDUs' is set for a TM RLC using the DTCH, and has three types of pre-set values (no/yes/no detect). The RLC layer processes the error-generated PDU differently according to the value set for the 'delivery of erroneous SDUs.'

First, if the delivery of erroneous SDUs is set as 'no', the TM RLC checks the CRC error information transferred together with the PDU from the MAC layer. If the corresponding PDU is detected to have an error, the TM RLC discards the corresponding PDU immediately.

If the delivery of erroneous SDUs is set as 'yes', the TM RLC checks the CRC error information transferred together with the PDU from the MAC layer. If the corresponding PDU is detected to have an error, the TM RLC informs an upper layer that the PDU has an error, when transmitting the PDU to the upper layer.

If the delivery of erroneous SDUs is set as 'no detect', the TM RLC does not check the CRC error information which has been received together with the PDU from the MAC layer, but processes the error-containing PDU like a normal PDU and transfers it to the upper layer.

The 'delivery of erroneous SDUs' are set as one of the above-described three values by the RRC at an initial stage of setting a radio bearer, and the RRC transfers the set 'delivery of erroneous SDUs' information to the MAC layer.

FIG. 4 is a flow chart of a related art data processing method of the MAC layer. As shown in FIG. 4, when the MAC PDU is transferred from a lower layer (step S401), the MAC layer checks whether there is a CRC error in the received MAC PDU (step S402). If the received MAC PDU does not have an error, the MAC layer processes the MAC PDU according to a normal processing procedure (step S404).

If however, there is an error in the MAC PDU, the MAC layer checks whether there is a MAC header in the received MAC PDU (step S403). If there is no MAC header in the received MAC PDU, the MAC layer processes the MAC PDU according to the normal processing procedure (step S404). If there is a MAC header in the MAC PDU, the MAC layer discards the MAC PDU (step S405).

FIG. 5 is a flow chart of a related art data processing method of the RLC layer. As shown in FIG 5, when an RLC PDU is transferred from the MAC layer (step S501), the RLC layer checks whether an environment parameter (or delivery of erroneous SDUs) for processing error data has been set (step S502). If the environment parameter has been set, the RLC layer processes a received RLC PDU according to a set error data processing procedure (step S504). Meanwhile, if no environment parameter has been set, the RLC layer processes the received RLC PDU according to a normal processing procedure (step S503).

When the MAC layer and the RLC layer process the PDU in the above-described manner, even if there is an error in the MAC PDU received from the physical layer, the MAC layer transfers a corresponding MAC PDU to the RLC layer if there is no MAC header in the MAC PDU If there is no header in the MAC PDU, this means that the transport channel and the logical channel are

mapped in a 1 1 ratio.

For example, there are various channel combinations of DTCH-DCH, DCCH-DCH, PCCH-PCH and BCCH-BCH Among them, only the DTCH-DCH is related to the AMR codec.

In more detail, of the above combinations, when the AMR codec of the higher application level uses data with a CRC error, namely, when the environment parameter (e.g., delivery of erroneous SDUs) is set, only then is the RLC layer in the TM state and data transmission is made through the DTCH-DCH.

Though not related to the AMR codec, examples of receiving an RLC PDU containing errors include when TM RLC performs data transmission via the DCCH-DCH, PCCH-PCH and BCCH-BCH, and when AM RLC or UM RLC performs data transmission via the DTCH-DCH and DCCH-DCH.

In these cases, since the RLC layer is not related to the AMR codec, the environment parameter (e g , delivery of erroneous SDUs) is not set, and the RLC layer handles the data having a CRC error as normal data and processes it.

When the RLC layer handles the data having a CRC error (i.e., CRC error data) as normal data, following problems arise. First, for TM RLC, because a PDU header is not attached for TM RLC, the received PDU is treated as a normal PDU and is just transferred to the upper layer.

When the RLC layer is in the TM state, the data transferred through the DCCH, PCCH and BCCH is the data that the RRC layer uses to manage radio resources. If the TM RLC transfers the data received through such channels to the RRC layer even if there is a CRC error, there is no problem in the operation of the TM RLC itself, but processing at the upper layer, i.e., at the RRC layer is

problematic. In other words, because the RRC layer uses data containing errors, this may cause problems such as the RRC layer performing an incorrect operation or the RRC layer may use an incorrect environment parameter to thus cause communication to be impossible.

When the RLC layer is in the AM state or in the UM state, the RLC layer itself causes a problem due to the existence of the RLC header The AM RLC (or the UM RLC) performs a coding by using the SN included in the header and updates its own security environment set information. In this respect, if there is an error in the SN of the PDU, coding cannot be performed properly and synchronization of the security environment set information between the terminal and the UTRAN cannot be properly achieved. If synchronization of the security environment set information between the terminal and the UTRAN cannot be properly achieved, then, even if the data transmitted thereafter has no CRC errors, restoration of the coded data transmitted thereafter would not be possible, thus causing communication errors

In addition, the PDU header of the AM RLC (or UM RLC) has information regarding the boundary surfaces (regions) of the SDU included in the PDU. If the error data is related to the SDU boundary surface information, the RLC layer cannot reconstruct the RLC SDU to its original form, resulting in serious communication errors.

[Technical gist of the invention]

Therefore, one object of the present invention is to provide a data processing method capable of preventing erroneous data unrelated to an AMR CODEC from being transferred to an upper layer by allowing a MAC layer to

determine whether erroneous data received from a lower layer is related to the AMR CODEC.

Another object of the present invention is to provide a data processing method capable of preventing erroneous data unrelated to an AMR CODEC from being transferred to an upper layer by allowing an RLC layer to determine whether erroneous data received from a lower layer is related to the AMR CODEC.

[Construction of the invention]

To achieve the above object, there is provided a data processing method for supporting an AMR CODEC, in which when a receiving side of a wireless communication system receives erroneous data, it checks whether the data is data for which an erroneous data processing method has been set, and if an erroneous data processing method has been set for the data, the data is processed according to the erroneous data processing method, whereas if the erroneous data processing method has not been set for the data, the data is discarded

The data for which the erroneous data processing method has been set is data required by an upper application layer, and data having an error according to the erroneous data processing method is discharged, transferred to an upper layer, or the error information is also transferred together when the data is transferred to the upper layer.

The data processing method for supporting the AMR CODEC in accordance with a preferred embodiment of the present invention will now be described with reference to the accompanying drawings.

FIG. 6 is a flow chart of a data processing method in accordance with a first embodiment of the present invention.

As shown in FIG. 6, according to the data processing method for supporting an AMR CODEC in accordance with the first embodiment of the present invention, when a MAC PDU is received from a lower layer (step S601), a MAC checks whether the MAC PDU has a CRC error (step S602). If there is no error in the MAC PDU, the MAC processes the MAC PDU according to a normal MAC PDU processing procedure (step S603). If, however, the MAC PDU has an error, the MAC checks whether the received MAC PDU has an added MAC header (step S604). If the MAC PDU includes a MAC header, the MAC discards the MAC PDU (step S605), whereas if there is no MAC header, the MAC checks whether an erroneous data processing method has been set (step S606). If an erroneous data processing method has not been set, the MAC discards the MAC PDU (step S605), whereas if an erroneous data processing method has been set, the MAC performs a MAC PDU processing procedure according to the erroneous data processing method (step S608).

In the processing procedure, the fact that there is no MAC header means that transport channels and logical channel correspond in a one-to-one manner, and the fact that the erroneous data processing method has been set means that it has been set whether the MAC is to discard the erroneous data, whether the MAC is to transfer it to an upper layer or whether the MAC transfer error information together simultaneously when transferring the erroneous data to the upper layer. Accordingly, among data with the CRC error, only data requested to be transferred by the upper layer is processed according to the setting of the erroneous data processing method and then transferred to the RLC. Namely,

when the received data has the CRC error, the MAC checks whether the data is related to AMR CODEC and, only when the data is related to the AMR CODEC, the MAC transfers the data with the CRC error to the RLC.

Thus, in the first embodiment of the present invention, a problem possibly caused as data irrelevant to the AMR CODEC is transferred to the upper layer can be prevented.

FIG. 7 is a flow chart of a data processing method in accordance with a second embodiment of the present invention.

As shown in FIG. 7, in the data processing method for supporting the AMR CODEC in accordance with the second embodiment of the present invention, when the RLC receives an RLC PDU which has been processed according to the related art erroneous data processing procedure from the MAC (step S701), the RLC checks whether the received RLC PDU has an error (step S702) If there is no CRC error in the received RLC PDU, the RLC processes the RLC PDU according to a normal processing procedure (step S703), whereas if there is a CRC error in the received RLC PDU, the RLC checks whether an erroneous data processing method has been set (step S704) If the error data processing method has not been set in the RLC PDU, the RLC discards the corresponding RLC PDU (step S705), whereas if the erroneous data processing method has been set, the RLC processes the corresponding RLC PDU according to the set erroneous data processing method (step S705).

In the processing procedure, the fact that the erroneous data processing method has been set means that it has been set whether the RLC is to discard the erroneous data, whether the MAC is to transfer it to an upper layer or whether the MAC transfer error information together simultaneously when

transferring the erroneous data to the upper layer. Accordingly, among data with the CRC error, only data requested to be transferred by the upper layer is processed according to the setting of the erroneous data processing method and then transferred to the upper layer. Namely, when the received data has the CRC error, the RLC checks whether the data is related to AMR CODEC and, only when the data is related to the AMR CODEC, the MAC transfers the data with the CRC error to the upper layer.

[Effect of the invention]

As so far described, the data processing method for supporting the AMR CODEC in accordance with the present invention has many advantages.

That is, when erroneous data is received from a lower layer, the MAC or the RLC layer checks whether the erroneous data is related to the AMR CODEC. If the erroneous data is not related to the AMR CODEC, the MAC or the RLC layer discards the data, whereas if the erroneous data is related to the AMR CODEC, the MAC or the RLC layer transfers it to the upper layer. Thus, such a problem as a communication failure which can be generated as the erroneous data unrelated to the AMR CODEC is transferred to upper layer can be prevented.

In addition, if erroneous data is received from a lower layer although it is not related to the AMR CODEC, the erroneous data is discarded by the MAC or the RLC layer. Thus, the resources according to the use of the AMR CODEC can be effectively used, and reliability with respect to various communication services can be enhanced.

What is claimed is:

1. A data processing method in a wireless communication system comprising:

receiving erroneous data by a receiving side;

checking whether an error data processing method has been set for the erroneous data;

processing the data according to a set erroneous data processing method if the erroneous data processing method has been set; and

processing the erroneous data according to a specific processing procedure if the error data processing method has not been set.

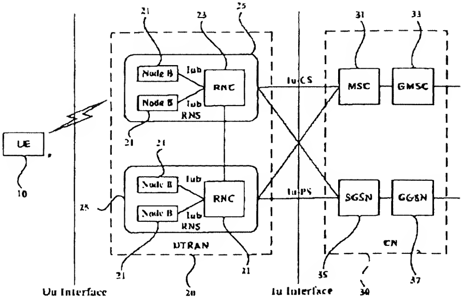
2 A data processing method in a wireless communication system in which an error of received data is discriminated and processed, comprising:

receiving error information of data together with the data from a lower layer by a specific protocol layer;

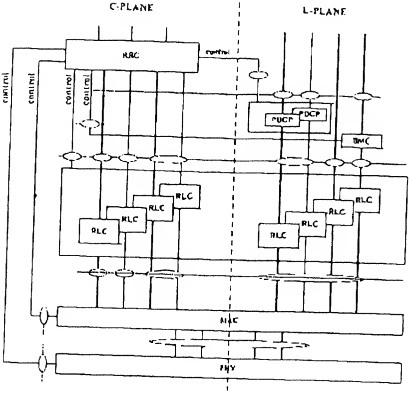
checking whether an environment related to processing error data has been set in case where the received data error information indicates that the data has an error; and

processing the erroneous data according to a specific processing procedure if an environment for processing the erroneous data has not been set.

【FIG.1】


21
23
25
31
33
Node B
Iub
RNC
Node B
Iub
RNS
Iu-CS
MSC
GMSC
UE
10
21
21
Node B
Iub
RNC
Node B
Iub
RNS
Iu-PS
SGSN
GGSN
25
UTRAN
CN
21
21
35
37
Uu Interface
20
Iu Interface
30

【FIG. 2】


C-PLANE
L-PLANE
RRC
control
control
control
control
control
PDCP
PDCP
BMC
RLC
RLC
RLC
RLC
RLC
RLC
RLC
RLC
MAC
PHY

【FIG. 3】

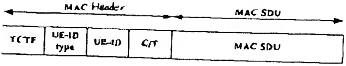

MAC Header
MAC SDU
TCTF
UE-ID type
UE-ID
C/T
MAC SDU

FIG. 4

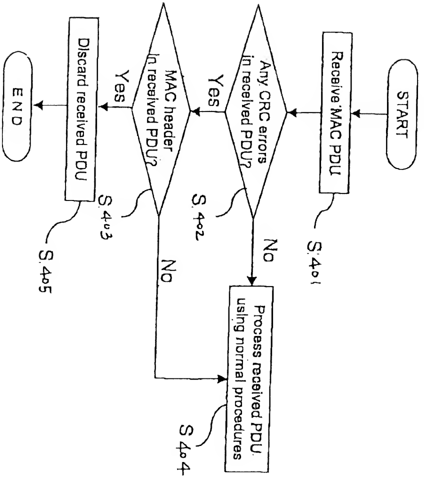

START
Receive MAC PDU
S401
Any CRC errors in received PDU?
S402
Yes
No
MAC header in received PDU?
S403
Yes
No
Discard received PDU
S405
Process received PDU using normal procedures
S404
END

FIG. 5

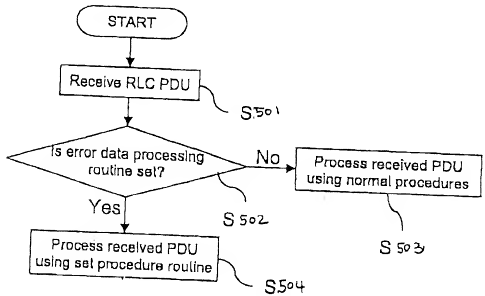

START
Receive RLC PDU
S501
Is error data processing routine set?
No
Yes
S502
Process received PDU using normal procedures
S503
Process received PDU using set procedure routine
S504

FIG. 6

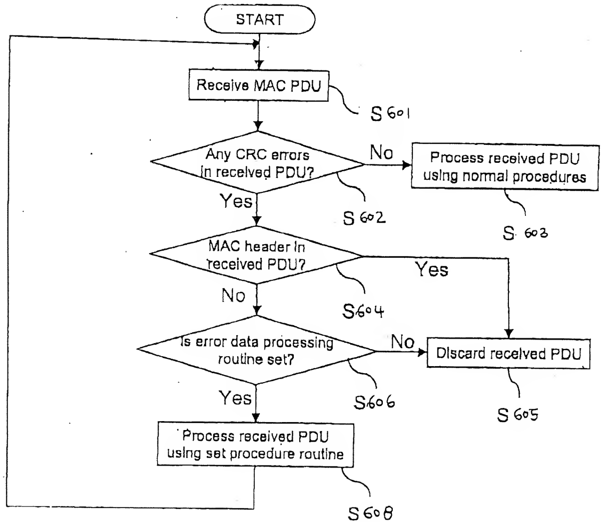
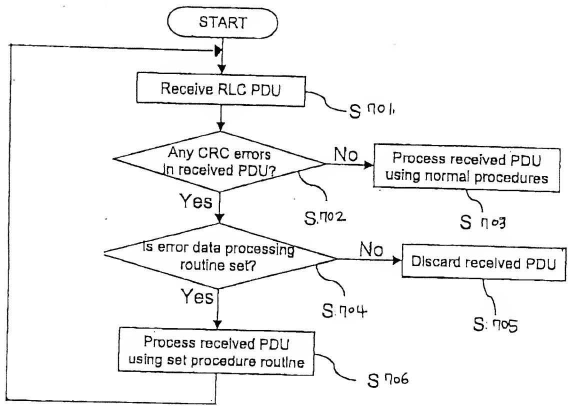

START
Receive MAC PDU
S601
Any CRC errors in received PDU?
No
Process received PDU using normal procedures
S603
Yes
S602
MAC header in received PDU?
Yes
S604
No
Is error data processing routine set?
No
Discard received PDU
S605
S606
Yes
Process received PDU using set procedure routine
S608

FIG. 7


START
Receive RLC PDU
S701
Any CRC errors in received PDU?
No
Process received PDU using normal procedures
S703
Yes
S702
Is error data processing routine set?
No
Discard received PDU
S705
Yes
S704
Process received PDU using set procedure routine
S706